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VACCINE VIRUS.

PROPAGATION AND SALE IN INTERSTATE TRAFFIC OF VACCINE VIRUS ON OR WITH POINTS PROHIBITED.

Under the provisions of section 4 of the act of July 1, 1902, paragraph 29 of the Regulations for the Sale of Viruses, Serums, Toxins, and Analogous Products in the District of Columbia and in Interstate Traffic, has been amended to read as follows:

29. The propagation and sale in interstate traffic of vaccine virus on or with "points" are hereby prohibited. Vaccine virus shall be furnished only in glass capillary tubes or in other glass container.

PUBLIC HEALTH ADMINISTRATION IN RUSSIA IN 1917.

By C.-E. A. Winslow, Professor of Public Health, Yale School of Medicine, Member American Red Cross Mission to Russia.

The most unique and significant contribution which Russia has made to the art of public health administration is the organization of a combined system of free medical care and health protection for her rural population through the medium of the zemstvos, or local representative assemblies. The problems of rural medicine and rural sanitation are everywhere most pressing and most difficult ones. In Russia, with 85 per cent of her population of some 180,000,000 living in rural districts, these problems are even more urgent than they are elsewhere. A brief consideration of the way in which their solution has been attempted is therefore fundamental to a conception of the general system of health organization of the new Republic.

History of Zemstvo Medicine.

According to the excellent sketch of "La Médecine du Zemstwo en Russie," prepared by E. Ossipow, I. Popow, and P. Kourkine for the XII International Congress of Medicine (Moscow, 1900), the first hospitals in Russia were built in connection with churches and monasteries after Vladimir embraced Christianity in 988. Many monks and priests became famous as healers in the period from the eleventh to the fourteenth century and lay physicians gradually made their appearance. Ivan the Terrible brought English medical men over in the sixteenth century and Peter the Great introduced many foreign physicians and sent Russians to learn the art abroad. He studied medicine himself and was particularly interested in its preventive side, personally prescribing directions for controlling plague in Kiev and Little Russia in 1718 and for army sanitation during the war with Prussia in 1722. Under Catherine the Great the Medical Faculty of Moscow was organized and many hospitals were established. The Medical-Chirurgical Academy (now the Military Medical Academy) was founded at Petrograd in 1800.

In spite, however, of advances made in the great cities the rural population of Russia lived and died practically without medical care. They were treated, if at all, by midwives and occasionally by feldschers, the latter being medical assistants of a type peculiar to Russia who have completed four years in the Gymnasium (about equivalent to our Grammar school graduation) and have then spent three or four years in special training which includes elementary anatomy, physiology, with a little bacteriology, pathology, and the like. Fully trained physicians were known in the country only as Government officials who made their appearance on the occasion of an autopsy or of some official inquiry.

The zemstvos or rural constituent assemblies were created in 1864 by Alexander II. They are elective bodies which conduct the local government of Provinces and of the rural districts within the Provinces and at present they exist in between 35 and 40 of the 50 Provinces of European Russia. Members of the zemstvos under the old régime were chosen by a special electorate including owners of a specified amount of land or property, representatives of educational and benevolent institutions, and commercial companies. Under the Republic the basis is of course universal suffrage and far-reaching changes in personnel are taking place as a result. The assemblies of Provinces and districts meet annually to legislate and to elect the permanent zemstvo administrative organization. Zemstvo activities deal with problems of local taxation, road construction and maintenance, local postal service and the like, as well as with education and health protection. In 1890 the original privileges of the zemstvos were limited by giving to provincial governors wide powers of veto over their acts. Under the Republic, however, the provincial zemstvo will exercise powers essentially similar to those of our State legislatures, while the district zemstvos will constitute units somewhat analogous to the county governments in certain of our Southern States.

When the zemstvo organization was created there were hospitals in the larger centers of population controlled by the provincial governors and there were a few small hospitals, chiefly served by feldschers, for the peasants of L'Etat and L'Apanage. The emancipated serfs were wholly unprovided for, as were the industrial workers with the exception of the miners in the Province of Perm. Altogether there were turned over to the newly organized zemstvos, 32 provincial hospitals with 6,200 beds and 303 district hospitals with 5,100 beds. These hospitals were for the most part in very bad repair, highly insanitary, and grossly mismanaged. There was rarely provision for adequate isolation of communicable diseases and it is small wonder that "the necessity of entering a hospital was regarded as a chastisement from God."

The idea of furnishing real medical care, not only to the city dweller but to the peasant in the remote rural district, seemed to many observers in 1864 too Utopian even to be thought of. The difficulties are indeed great. In some regions villages may be a mile apart with 50 inhabitants per square mile. In other regions villages may be 5 to 15 miles apart with 5 to 10 inhabitants per square mile. Yet it was to this Herculean task that the zemstvos promptly addressed themselves. At first a compromise was attempted by confiding the routine treatment of disease in rural districts to feldschers under the supervision of itinerant physicians. About 1870, however, the waste of the time of the physician and the inadequate service rendered by the feldscher led to the introduction of the system of fixed medical districts each provided with a small hospital and a qualified physician. Itinerant service was defended as cheaper and more democratic, but the stationary plan has gradually won its way and become almost universal except in the very sparsely-settled districts.

So successful were the zemstvos in the expansion of this side of their work that by 1890 instead of the 335 hospitals with 11,309 beds originally turned over to them, there were 1,422 zemstvo medical districts with 1,068 hospitals of 26,571 beds, and 414 dispensaries. Between the years 1870 and 1890 the number of zemstvo doctors increased from 756 to 1,805 and the number of nonmedical assistants (feldschers, midwives, pharmacists, etc.) from 2,794 to 6,778. A large part of rural Russia is now divided into medical districts, each of which centers about a small hospital or dispensary. Medical care is always given without charge and there has been a steadily increasing tendency to make all dispensary and hospital treatment free as well. The care of the sick is recognized by the zemstvos as a natural duty of society rather than as an act of charity.

The Work of the Zemstvos Along Preventive Lines.

Aside from this purely medical work, which was their original function, the zemstvo physicians in most Provinces are extending their activities along preventive lines, while in such provinces as Moscow, Petrograd, and Kherson there are completely organized sanitary bureaus aside from the regular zemstvo medical staff. The relation between the prevention of disease and the free medical care of the poor is, however, throughout a very close one, and it is interesting to note that this has come about by the expansion of a State medical service along preventive lines, while with us the reverse process is taking place, health departments, originally organized for preventive work alone, developing as an offshoot provisions for medical examination and clinical care of the individual.

By a law enacted in 1852, public health committees with district physicians were created in the provinces, but these district physicians had also to perform all the duties of local legal medicine and the machinery to be set in action was cumbrous in the extreme. An epidemic in a remote rural district was reported by the Starosta (village head) to the chief of the group of Volosts villages in question, then to the district police, then to the committee on public health, and finally to the governor. After a month or two the district physician would arrive, to find that the epidemic had run its course, to make a proper report thereon, and to assess his traveling expenses against the afflicted village.

Very soon after the establishment of the zemstvos it became clear that their decentralized plan of organization furnished an opportunity for far more effective public-health work than could be hoped for from the bureaucratic provincial governments. In 1867 the provincial zemstvo of Poltava established a permanent medical commission which presented a report in print in 1869. In the next year the medical society of Kazan began active work along public-health lines. Both these groups of physicians, with many others—particularly provincial assemblies of zemstvo doctors—strongly urged the need of special sanitarians to supervise and develop the work of preventive medicine. The higher zemstvo officials were at first unsympathetic with this program. In 1879 a first step was taken by the employment of a special sanitary expert to study problems of industrial hygiene in Moscow Province. The Province of Kherson appointed seven special sanitary officers in 1886, while Petrograd Province created a sanitary organization with a director and nine district sanitarians only in 1896. Most of the provincial organizations are even to-day without special full-time sanitarians; but the regular zemstvo physicians are expected to devote a certain proportion of their time to school inspection, control of epidemics, collection of vital statistics, and public-health education.

Zemstvo Medicine in the Provinces of Moscow and Saratov.

The Province of Moscow has perhaps the most highly developed organization for the promotion of zemstvo medicine to be found in Russia. It supports at the present time approximately 100 hospitals—

one for every 10,000 to 15,000 inhabitants. Each hospital has from 20 to 60 beds and a personnel on the average of two physicians, four feldschers, and four sisters (nurses). The larger establishments include 16 to 20 beds for general use, 5 to 12 for communicable diseases, and 3 to 4 for maternity cases. Mental cases are cared for in special institutions maintained by the provincial zemstvos. Each hospital has its dispensary (averaging 100 visits a day) and all medicines as well, of course, as all medical care, are given free. Home visits are made by the regular zemstvo physicians only in serious cases. Financial aid is often given to women in childbirth and to invalids who can not be brought to the hospital.

For the special work of disease prevention Moscow Province is divided into thirteen sanitary districts, each with a sanitary supervisor in charge and with two or three assistants to the supervisor in the larger districts. These officials are full-time medical men. It is their duty to inspect and pass on plans for water supplies, sewerage systems, public buildings, and the like, to inspect industrial establishments, to collect vital statistics, and transmit them to the provincial office, as well as to deal with outbreaks of communicable disease. The work of these sanitary supervisors is coordinated by the provincial sanitary bureau, which maintains a central statistical division, a laboratory, and a vaccine institute. There is also a sanitary council for the whole province and one for each district within it—the former including representatives of the provincial zemstvo assembly and of the sanitary bureau divisions with the 13 district physicians—a district council including representatives of the district zemstvo and of the cities within the district as well as all the zemstvo and factory doctors of the district in question. Ultimate control of sanitary work belongs of course to the provincial and district zemstvo assemblies, with their respective administrative officers. The sanitary code which was in force before the revolution was prepared by the provincial assembly and promulgated by the governor.

The Province of Saratov offers a good example of well-organized zemstvo medicine in a smaller and more rural district, which was well illustrated by a special exhibit at the Dresden Hygienic Exposition (Erklärung zu den Exponaten der Saratower Gouvernements Semstvo auf der Internationalen Hygiene Ausstellung in Dresden im Jahre, 1911. Saratov, 1911). The provincial zemstvo in 1911 maintained a general hospital of 200 beds and a psychiatric hospital of 460 beds for a population of somewhat over 3,000,000. The district zemstvos maintained 123 medical districts with 78 hospitals and 1,106 beds (one hospital bed to 2,525 persons). In addition to the 123 medical districts, each of which had its own physician, medical assistance was offered by feldschers or other medical helpers at 55 other points.

Forty-five of the medical districts had a polyclinic only, 9 had 4-bed hospitals, 30 had 5 to 10 bed hospitals, and 2 had hospitals of more than 40 beds; 525.9 clinic cases and 9.1 resident cases were treated per 1,000 population; 33.2 per cent of the provincial budget and 31.6 per cent of the district budgets were appropriated for medical and sanitary purposes (total of both amounting, however, to only about 50 kopecs per capita).

The regular zemstvo physician is supposed to exercise general sanitary supervision of his district, to combat epidemics, inspect schools, and educate the public on health matters. The zemstvo has provided also in each district a sanitary supervisor with laboratory equipment sufficient for simple chemical and bacteriological examinations and a central sanitary bureau which analyzes vital statistics, publishes a monthly bulletin, maintains a Pasteur institute, and employs emergency workers in case of epidemics (131 such workers, 13 of them physicians, were employed to combat scarlet fever and typhus fever in 1910, and 231, of whom 46 were physicians, to deal with cholera).

Before leaving the general subject of zemstvo medicine, a word must be said about the splendid services which the zemstvo organizations have rendered along army medical and sanitary lines during the war. Just as the zemstvos accomplished in civilian health-protection tasks which seemed impossible to the bureaucratic authorities, so, when the strain of war proved too heavy for the constituted agencies, the union of zemstvos, the union of municipalities, and the Russian Red Cross stepped into the breach and assumed a large share, not only of the medical care but of the clothing and provisioning of the army. The zemstvo and municipal unions now maintain 200,000 hospital beds in the rear for army use, as well as a large organization at the front, and they have an elaborate and well-organized machinery for purchasing or manufacturing and distributing medical and surgical supplies. A central committee, representing the unions of zemstvos and municipalities, the Russian Red Cross, and the sanitary department of the army, meets every night in Moscow to plan for the evacuation of sick and wounded soldiers, of whom 4,000,000 have been handled by this and other similar committees since the beginning of the war.

In Russia, as elsewhere, the most intensive development along public-health lines has taken place in the cities and particularly in the two cities of Moscow and Petrograd, which are in the 2,000,000-population class. Kiev, Lodz, Odessa, Riga, and Warsaw are the only other cities with more than 400,000 population, with thirty-odd cities with between 100,000 and 400,000 population.

Moscow city health administration.

As in the case of provincial zemstvo organizations, Moscow leads also in municipal health administration. An excellent description of the sanitary machinery of the city was prepared for the Dresden Exposition (Die Stadt Moskau in gesundheitlicher Beziehung; Moskau, 1911); and I found the general outline of the organization was still essentially the same in 1917.

The water supply of the city (averaging in 1915, 10,100,000 vedros, or 27,270,000 gallons, per day) is derived chiefly from the Moscow River, and is purified by slow sand filtration with chemical coagulation when necessary. About one-sixth of the total supply is, however, contributed by well waters from Mytiszczy. Bacteriological results on the treated water are good, and the comparatively low death rate of the city from typhoid fever is good evidence of the effectiveness of the process.

Moscow is one of the very few Russian cities which have installed comprehensive systems of sewerage and sewage disposal. I was informed that not over a dozen cities in Russia have sewerage systems which receive fecal wastes and that only four or five have any system of sewage treatment. Nijni Novgorod has Imhoff tanks, Kharkov trickling filters, and Moscow and Odessa irrigation areas.

Even in Moscow, only the central district of the city is at present connected with the sewers, and in 1915, 572,442 cartloads of night soil (averaging 28.5 poods or 1,026 pounds per load) were removed from the outlying districts and dumped under highly offensive conditions in areas of low land. The sewage proper, which amounted in 1915 to 6,768,000 vedros, or 18,274,000 gallons, per day, flows to two separate irrigation areas, one at Lubline which treats about two-thirds of the total amount (about five and one-half million gallons in the summer of 1917) and another at Luberzy, which handles the remainder and provides space for expansion in the future as the outer zone of the city is gradually connected. The Lubline farms, which were the only ones I visited, include about 1,000 desiatins (2,700 acres), of which about a tenth is under cultivation, cabbages, rye grass, and willows being among the principal crops. The main part of the area is not cropped but is operated essentially on the plan of intermittent filtration. Of the total area, about half is clay, a quarter peaty soil (tourbe), and a quarter sand, and operating results differ materially, as would be expected, on the different soils. The clayey and peaty areas treat about 3,000 vedros per desiatin; the best of the sand areas about 25,000. (Since a vedro equals 2.7 gallons and a desiatin 2.7 acres, vedros per desiatin and gallons per acre are interchangeable terms.) Doses of sewage are applied to a given area at intervals of from 4 to 10 days, depending on the character of the soil. The sewage pumped to the sand beds, which are on a higher level than the others, is submitted to bar screening (2½ cm. mesh) and brief sedimentation (10 minutes). The rest of the sewage receives no preliminary treatment.

The most interesting thing about the Moscow sewage-disposal plant is the admirable experiments which are being conducted on various alternative methods of treatment under the direction of M. Serge Stroganoff, who has made exhaustive large-scale studies of Imhoff tanks, contact beds, and trickling filters (the latter equipped with rectangular and circular Fiddian distributors as well as with American type spray nozzles), and is now devoting particular attention to activated sludge treatment. When I visited the plant four experimental basins were in operation, treating 50,000 vedros (135,000 gallons) a day by the activated sludge process with excellent results. The tanks are about 2.5 meters in depth and are operated on the fill-and-draw plan with four hours' aeration and 20 to 30 minutes' sedimentation. The air is distributed not through filtros blocks but from 2.5-millimeter openings on the under side of 1¾-inch pipe. The result of this procedure seems to warrant its further study. Forty volumes of air per volume of sewage was being used at the time of my visit, which is not bad for the extremely concentrated sewage treated, and M. Stroganoff believes that by improvements in distribution which he has worked out, this amount of air can be cut to 10 volumes of air for one volume of sewage. He hopes shortly to undertake the construction of a 3,000,000-vedro activated sludge plant which will release the irrigation area or a considerable portion of it for use as a municipal dairy farm.

Aside from these strictly sanitary engineering problems, the health administration of the city is directed, so far as its general policy and finances are concerned, by a board of health of 20 members. There is also an advisory medical board, representing the hospitals, district and school inspectorate, etc., which passes on recommendations of bureau chiefs as to medical policies and nominates candidates for medical posts, a sanitary advisory board which exercises similar functions in regard to problems of epidemiology and the like, and half a dozen smaller advisory boards which consider special problems relating to ambulances, hospitals, obstetrics, psychiatry, school inspection, veterinary medicine, pharmacy, etc. This system of advisory boards through which the expert staffs express their views on the problems of policy which concern them is very characteristic of Russian health administration in all its phases and on account of its broadly democratic character is likely to develop even further under the Republic.

Executive authority is divided between three bureau chiefs who deal respectively with hospitals, sanitation, and sanitary statistics, all of them being physicians. This arrangement, with its close correlation between hospitals and sanitation and the recognition of statistics as an independent branch of cognate importance, is also typical of general practice in Russia.

The statistical bureau of Moscow, under Dr. Mikhailovsky, is particularly well organized. It is equipped with a library of 50,000 volumes and its reports (summarized in the volumes of the Annuaire Statistique de la Ville de Moscou and Bulletin Recapitulatif de la Ville de Moscou) will repay careful study.

The routine sanitary work of the city is conducted by 20 district medical inspectors, who are charged with the general functions which belong to the divisions of communicable diseases and sanitation in an American city health department; that is, they visit cases of acute communicable disease, secure their isolation, study the epidemiological factors involved, and inspect factories, lodging houses, and the like. The work of terminal disinfection, which still occupies a very prominent place in Russian sanitation (and with some propriety in view of the prevalence of insect-borne diseases), is cared for by a chief disinfector with some 25 assistants; and the city maintains an elaborate disinfecting station for clothing and bedding with steam and hot water disinfection and with a "Japanese chamber" for combined heat and formalin treatment. For food control there is a separate force of 20 inspectors and analytical work is carried out in a well-equipped food and water laboratory. Diagnostic examinations are made at the university and the various hospitals. Finally, there is a third group of 20 medical men for school inspection. Each of these physicians has about 20 schools and some 3,000 children under his care. He inspects the school buildings and at the beginning of the year makes out an individual health card for each child and keeps track of all who are in need of special attention. He attends to the isolation of school children and the disinfection of the schoolroom, instructs the teacher in the early signs of communicable disease, and sends children in need of treatment to the general hospitals or to the special school clinics maintained for the treatment of diseases of the eye, ear, nose, throat, and teeth. Vaccination is stimulated by sending medical students out to vaccinate free of charge in the poorer districts, but is not compulsory.

The city of Moscow maintained 24 public hospitals in 1915 with a total of 6,992 beds, and the number of new patients entering during the year was 72,830; 1,264,676 persons made a total of 2,969,806 visits to the public dispensaries. There is one special hospital of over 400 beds and one special clinic, for venereal cases, while cases of this character, if not in an infective stage, may be received at any clinic. There are two sanatoria for tuberculosis with a capacity of about 40 beds each, but tuberculous cases are also admitted to most of the general hospitals.

Mention should be made of the admirable municipal lodging houses maintained by the city with over 5,000 sleeping places.

For dealing with the important problem of infant mortality the city maintains three infant welfare stations at which some 3,000 infants are received during the year and about 100,000 quarts of milk distributed. The principal station, in connection with the Morosov Hospital, is the most perfectly equipped plant for the purpose which I have ever seen. The rooms are light, airy, and tiled, every possible equipment for the medical examination of the infants and for the preparation of milk is provided, and the waiting room is furnished with an admirable collection of models and pictures illustrating good and bad methods of infant care, the models of dangerous foods and the pictures of objectionable methods of clothing and the like being all labeled in red so that the most ignorant mother can not fail to grasp their signficance.

There are also in Moscow three smaller infant welfare stations maintained by a private society for the campaign against infant mortality, which provided for 1,638 children in 1916.

Expenditures for medical purposes have risen from 5.2 per cent of the total municipal budget in 1870 to 14.7 in 1910 and to 17.0 per cent in 1914, and over 20 per cent in 1915, the last two figures being unduly swollen by war conditions. Of what may be considered a normal health budget of 5,078,730 roubles in 1910, 80.8 per cent was for hospitals, 8.7 per cent for lying-in hospitals, 5.0 per cent for clinics, 3.2 per cent for public health work, 1.2 per cent for grants to private hospitals, and 0.9 per cent for veterinary inspection.

The table below for the 25-year period, 1886–1910, gives an interesting picture of the relative prevalence of various communicable diseases indicated by the numbers of cases recorded.

Prevalence of various communicable diseases.

Disease.	Cases recorded, 1886–1910.	Per cent of all communicable diseases.	Disease.	Cases recorded, 1886–1910.	Per cent of all communicable diseases.
Measles	96,166	19.36	Typhoid fever	28,679	5.78
Scarlet fever	72,567	14.61	Typhus fever	23,434	4.72
Diphtheria	68,768	13.85	Typhus or typhoid fever	21,842	4.40
Relapsing fever	45,861	9.24	Parotitis	13,424	2.70
Dysentery	45,158	9.09	Variola and varioloid	12,217	2.46
Whooping cough	32,665	6.58	German measles	3,844	.77
Chicken pox	28,743	5.79	Cholera	3,067	.62

The death rates for 1915 as certified for various specific causes calculated on an estimated population of 1,984,000 are as follows, the total registered death rate from all causes being 22.4.

Registered death rate from various causes in Moscow, 1915.

Cause of death.	Rate per 100,000.	Cause of death.	Rate per 100,000.
Typhoid fever	14.9	Other epidemic diseases	0.7
Typhus fever	1.9	Rabies	10.6
Relapsing fever	.2	Syphilis	8.0
Undetermined fevers (any of above)	1.0	Puerperal fever	9.9
Smallpox	12.2	Pulmonary tuberculosis	191.1
Measles	91.0	Other forms of tuberculosis	32.8
Scarlet fever	70.3	Croupous pneumonia	54.4
Diphtheria	40.6	Other respiratory diseases	351.0
Dysentery	46.5	Diarrhea and enteritis:	
Anthrax	.9	Under 2 years	352.0
Intermittent fever	.2	Over 2 years	20.4
Influenza	11.7	Homicide	2.8
Whooping cough	17.2	Suicide	7.0
Cholera	6.7	Other violent deaths	45.2
Erysipelas	18.1	All other causes	823.0

It will be noted that measles, as is often the case with us, is the most serious of the acute contagia, that typhoid fever is fairly low, that diphtheria is high, and scarlet fever very high. Typhus and relapsing fevers have been fairly well controlled in recent years, though the central location of Moscow and its heavy railroad traffic have in the past exposed the city to frequent infection with these diseases, which have often made their first local appearance in the lodging houses. Smallpox is still a serious factor in the death rate, and dysentery constitutes a grave problem. Pulmonary tuberculosis is fairly high and is probably much higher than is indicated on the face of the returns, since the figure of over 400 for pneumonia and other respiratory diseases, as compared with less than 200 for pulmonary tuberculosis, suggests defective diagnosis. The rate for diarrhea and enteritis under two years is appalling.

Health Organization of the City of Petrograd.

The general sanitary organization of Petrograd is very similar to that of Moscow, more highly developed along certain lines, and less complete in some other departments.

The water supply of the city is derived from two sources, a main station on the southern mainland side of the Neva which supplies about 25,000,000 vedros (67,000,000 gallons) a day and a smaller 5,600,000 vedro (15,000,000 gallons) plant on Petrograd Island. The main plant originally consisted of 18 filters of the English slow sand type but they have been reconstructed for use as American rapid mechanical filters by dividing each one into 12 sections. On account of deficient capacity it has been the custom at this plant at times to filter part of the water without chlorination and to chlorinate another part without filtration. The bacteriological results of these two methods as well as of the combined treatment for the year 1914 were as shown below.

Bacteriological results of various treatments applied to Neva River water, averages, 1914.

	Bacteria per c. c.	Per cent positive tests for B. coli in $\frac{1}{10}$ c. c.
Raw water	364	47.0
Filtered water	73	3.0
Chlorinated water	16	.02
Filtered and chlorinated water	5	.007
Mixtures as delivered	45	1.3

Great difficulty has been experienced in procuring either alum or bleaching powder since the war, and chlorination is now effected by the use of a sodium hypochlorite solution prepared on the spot by the electrolysis of salt.

The smaller plant on Petrograd Island includes 10 settling basins, 49 American rapid filters, a storage basin, and a Siemens-Otto ozone disinfecting outfit. The filters are of the mechanical wash type and the ozone apparatus appears to be working very satisfactorily, although at high cost. This plant, like the larger one, is now being strained beyond its capacity, and a resort to a wholly new supply brought in from Lake Ladoga will probably prove the ultimate solution of the problem.

The waste disposal system of Petrograd is a curiously primitive one for a great European capital. There is an extensive series of sewers in the city, but, as in London and Paris 50 years ago, they are not used for fecal wastes. The latter are collected in cesspools which are pumped out at night (at intervals varying from 2 weeks to several months) into special carts with cylindrical metal bodies which convey the sewage liquids to a disposal station near the west end of Vassilyevsky Island. About 200 such carts reach the station every day. The sewage matters are screened by passing them through Riensch-Wurl screens, the liquid is discharged through a 10-inch sewer at a point 7 kilometers out to sea, and the screenings are burned in the adjacent garbage destructor.

This destructor, it may be mentioned in passing, is one of two Heenan and Froude 4-unit furnaces, each of which destroys between 5,000 and 6,000 poods (180,000 to 216,000 pounds) a day. They handle only about a quarter of all the refuse produced by the city, the rest being dumped.

The health organization of Petrograd is centered in the sanitary bureau, which has three main divisions—sanitation, epidemiology, and sanitary statistics—although the powers and responsibilities of the three divisions are not sharply limited, the same employees in some cases being responsible to two division heads. Thus the 40 district physicians who form the backbone of the staff not only do the work of sanitary inspection, building inspection, and plumbing inspection in their respective districts, but also the work of isolating cases of communicable disease and studying the epidemiological factors concerned. In addition to these men, the epidemiological division has 20 medical inspectors of food stores and 11 medical lodging-house inspectors, or a total of 71 physicians in all. The very able head of this division is Dr. Haffkine, a nephew of the bacteriologist who is so well known for his researches on bubonic plague. Medical inspection of schools is now under another city department, 50 physicians being employed, with 11 eye specialists and 20 dentists.

The city has a large contagious-disease hospital, built on the barrack plan, with 44 barrack buildings and some 1,200 beds. On the hospital grounds there is an elaborately equipped central disinfecting station for the treatment of clothing and bedding. It includes a number of large sterilizers, some operated with steam and some with formaldehyde, all controlled from a central glass-walled observation chamber. There is also at this station an extensive equipment of disinfecting apparatus for house disinfection, and sanitary officials from all over Russia come here (to the number of perhaps a hundred a year) to study the technique of disinfecting practice.

The sanitary bureau has an admirable chemical and bacteriological laboratory (the latter under the direction of Dr. V. Yakovlev). Three bacteriologists are employed, and in 1916 11,974 examinations were made for diphtheria and 1,711 for tuberculosis, besides examination for cholera, dysentery, relapsing fever, typhoid fever, and glanders. In 1908-1910 five bacteriologists were employed to deal with the cholera epidemic existing at that time, and during the three years 26,000 examinations of feces were made and 13,000 of water. The highly significant results of these cholera studies have been printed by the city in the form of a large monograph.

The city also maintains a vaccine institute under Dr. Gamaleia, which turns out 300,000 grams of vaccine a year (each gram being equivalent to something over 10 doses). Since the Revolution the enforcement of vaccination is no longer possible and the institute had over a million doses of vaccine on hand at the time of our visit.

The division of sanitary statistics (under Dr. Fedoroff) is excellently organized. It was interesting to us to note that slips of paper are still used in Russia instead of cards for the registration of births and deaths.

Health ordinances are framed by a central health board, which includes 30 health-department physicians and 30 city Duma members.

The hospitals of the city are at present under a completely distinct bureau organization. Twelve general municipal hospitals are maintained in which on a given day in August, 1917, there were 12,311 patients. In 1914, the last year for which we were able to obtain printed statistics, there were 11,930 beds and 144,704 patients treated. The city also carries on 11 free dispensaries, which average about 450 visits a day. There are 15 public maternity hospitals with 347 beds. It may be noted in passing that in 1915 24,808 out of 40,141 births in the city of Petrograd occurred in hospitals.

The total expenditure of the city for medical, veterinary, and sanitary purposes in 1914 was a little over 9,000,000 roubles, 17.8 per cent of the total municipal expenditure. About one-seventh of this, or 1,300,000 roubles, was for the sanitary bureau, whose work has been specially discussed above. This amount will be just about doubled for next year, not to provide for any expansion of work but simply to allow an increase in salaries to compensate for the fall in the value of the rouble and the increase in the cost of living.

Comprehensive plans are under consideration for the reorganization of the whole system of health adminstration to bring the hospital care and the preventive work more closely together on the one hand and, on the other, to provide for greater decentralization in local administration for the various districts of the city. The plan below has been recommended by a committee which was specially appointed to study the problem.

PROPOSED PLAN OF PUBLIC HEALTH ORGANIZATION FOR PETROGRAD, ALL BRANCHES TO BE UNDER A COMMISSION ON PUBLIC HEALTH WITH A MUNICIPAL MEDICAL BOARD.

Department:
- I. Sanitary—
  - Functions—
    - A. Sanitation—
      - 1. Purification of sewage.
      - 2. Water supply.
      - 3. Waste removal.
      - 4. Industrial hygiene.
      - 5. Hygiene of transportation.
      - 6. Disposal of the dead.
    - B. Communicable diseases—
      - 1. Prevention of communicable disease.
      - 2. District sanitary inspection.
      - 3. Disinfection.
      - 4. Isolation.
      - 5. Vaccination.
- II. Veterinary—
  - 1. District veterinary inspection.
  - 2. Horseshoeing and medical care of horses.
  - 3. Inspection of sales stables and of the health of horses.
  - 4. Removal of bodies of dead horses.

Department—Continued.

- II. Veterinary—Continued.
    - 5. Prevention of rabies.
    - 6. Inspection of abattoirs and of imported meat products.
    - 7. Inspection of stables, pig sties, etc.
- III. Sanitary—
    - Statistical—
        - 1. Sanitary and medical statistics.
        - 2. Sanitary records of dwellings, etc.
- IV. Medical—
    - A. Outpatient service—
        - 1. Medical aid in dispensaries and homes.
        - 2. Midwifery.
        - 3. Safeguarding of mothers and infants.
    - B. Hospital service—
        - 1. General hospitals.
        - 2. Special hospitals.
    - C. Pharmaceutical service—
        - 1. Supplying drugs through city and hospital pharmacies.
        - 2. Providing drugs.

Each subdivision of a department should, it is suggested, work under the guidance of an advisory council, made up of the sanitarians, physicians, veterinarians, statisticians, etc., themselves.

Of the two great problems of tuberculosis and infant mortality, to which our own health departments are now devoting so much attention, the first is still almost neglected in Petrograd as a public-health problem. There is one sanatorium in Finland with 60 beds and out of 144,000 patients received in the general city hospitals during 1914, 10,605 were cases of pulmonary tuberculosis and 1,612 of tuberculosis in other forms. It is believed by many that tuberculosis has materially increased during the war, but on account of the heavy demands placed upon the medical personnel of hospitals and dispensaries accurate statistics are hard to obtain.

Infant welfare work is more fully developed in response to the urgent need which exists for activity along this line, in Petrograd as everywhere in Russia. In 1915 one-quarter of the infants born in Petrograd died before reaching the age of one year (as against less than one-tenth in New York City, the excess corresponding to a loss of 6,000 lives a year). There is, however, the nucleus of an admirable organization of milk stations and baby clinics in Petrograd, 1 being maintained by the city itself, 8 by the district dumas, 5 by the All-Russian Patronage for the Protection of Motherhood and Childhood, and 12 by other agencies. Between 5,000 and 6,000 children are cared for at these various stations. The number should be doubled or trebled. The work of existing institutions is at present seriously hampered by the grave shortage of milk. There was available last September only about 1 quart of milk for every 30 people in the total population, one-third of the quantity available before the war and one-tenth of the amount deemed necessary by conservative food experts.

The birth rate of Petrograd has fallen from 30.7 per 1,000 in 1907 to 24.9 in 1914 and 22 in 1915, in which year it fell below the death rate (23.2 per 1,000).

The death rates as recorded by principal causes for 1914 are shown in the table below:

Recorded death rates from various causes, Petrograd, 1914.

Registered causes of death.	Rate per 100,000.	Registered causes of death.	Rate per 100,000.
Typhoid fever	35.8	Broncho-pneumonia	262.2
Typhus fever	1.0	Other respiratory diseases	43.5
Smallpox	16.6	Cancer	83.2
Measles	88.4	Sarcoma and other neoplasms	6.9
Scarlet fever	40.6	Alcoholism	31.9
Diphtheria	30.0	Cerebral apoplexy	61.4
Dysentery	25.1	Other cerebral diseases	87.2
Epidemic gastroenteritis	2.6	Diseases of heart and arteries	170.0
Anthrax	.3	Gastroenteritis:	
Influenza	19.0	Under 2	239.0
Whooping cough	20.2	Over 2	25.4
Erysipelas	14.2	Other digestive diseases	50.6
Puerperal fever	4.9	Urinary diseases	46.0
Pyemia and septicemia	35.1	Congenital debility	147.8
Rabies	.2	Senile marasmus	53.5
Other contagia	11.6	Suicide	22.2
Pulmonary tuberculosis	299.5	Accident	61.3
Other forms tuberculosis	54.4	Homicide	4.4
Lobar pneumonia	81.7	All other causes	87.8

In comparing these death rates with those for Moscow cited above it appears that the prevalence of the acute contagia is much the same in the two cities, measles leading all the rest. Scarlet fever was much more prevalent in Moscow in 1915 than in Petrograd in 1914, but this was due to a special outbreak in the former year. On the other hand the higher incidence of typhoid in Petrograd is characteristic and very possibly connected with imperfections in water purification, while dysentery is regularly higher in Moscow on account of its warmer climate and closer proximity to regions where this disease is very common. Cholera, which has disappeared from Petrograd in recent years, still occurs periodically in Moscow. The fact that the diarrhea and enteritis rate, which, while very high in Petrograd, falls short of the enormous figures reached in Moscow, is perhaps due in part to the cooler summer weather of the capital. Tuberculosis, on the other hand, appears to be far higher in Petrograd than in Moscow, the figures being 299.5 as compared with 191.1 for pulmonary and 54.4 as compared with 32.8 for other forms of tuberculosis. The combined rate for all forms of pneumonia and other respiratory diseases is lower in Petrograd, 387.4 against 405.4, so that better diagnosis may in some part account for the difference. It would be unsafe to stress this point, however, without a study of age distribution in the two cities, and we know that in our own country there are cities like Pittsburgh which are actually characterized by low tuberculosis rates combined with a very high incidence of pneumonia.

The Central Bureau of Public Health.

There remains finally to be considered the government bureau which corresponds in many respects to our United States Public Health Service, a body which has been of some importance in the past and which, as in our own country, promises to play a much larger part in the future.

The central bureau of public health was endowed, theoretically, with large powers before the Revolution and had an inspector in each Province with 10 or 12 subinspectors under him, in all a force of nearly 2,000 physicians. The central organization at present includes a division of administration; a division for the supervision of hospitals, medical schools, schools for feldschers, and the like; a division for sanitary and epidemiological work; a division for the supervision of mineral springs, medicinal baths, etc.; and a division of statistics.

The reports issued annually by this bureau on the "Condition of the National Health and the Organization of Medical Service in Russia" contain much valuable material in regard to the current status of medical and sanitary matters.

Thus the report for 1914 (the last which is in print) shows that in that year there were in the Empire—excluding Poland and the three Provinces of Vilna, Kovno, and Kholm—18,320 physicians engaged in civil practice, of whom 15,433 were men and 2,887 women. In the cities there was 1 physician to 1,700 inhabitants and in the rural districts 1 to 23,000 inhabitants. Of medical assistants (feldschers, etc.) there were 25,310, of whom 18,577 were men and 6,733 women. There were 11,764 pharmacists, 4,706 physician-dentists, 2,216 dentists, and 11,925 midwives. There were 4,287 medical districts under the direction of zemstvo or municipal physicians and 4,952 additional points in charge of medical assistants.

For the same area (the Empire exclusive of Poland and the three Provinces mentioned) there were 7,617 hospitals and dispensaries with 217,806 beds for civilian use. Only 39 per cent of the hospitals had more than 15 beds, 39 per cent had 6 to 15 beds, and 22 per cent had less than 6 beds each, indicating the growth of small rural hospitals under the zemstvo medical organization. There were 3,349,083 patients treated in the hospitals during the year with a mortality of 4.5 per cent, and an average period of treatment of 19.4 days. Excluding obstetrical and psychiatric cases there were 2,924,539 patients treated with a death rate of 4.8 per cent and an average period of treatment of 16 days. Of maternity hospitals there were 908 with 7,591 beds. In these hospitals there were 311,937 births in 1914, 83 per cent of them normal, 6 per cent premature, and 11 per cent miscarriages.

The 4,791 registered pharmacies, registered in the area mentioned above, filled 32,412,972 prescriptions for which they received 18,185,628 roubles, while they took in over the counter 13,816,025 roubles more.

Fifty-four hygienic laboratories for the analysis of food products were registered with the bureau, 44 maintained by cities, 2 by zemstvos, 1 jointly by city and zemstvo, and the rest by Government bureaus or private agencies. Thirty-four of these laboratories were directed by physicians, 9 by chemists, 7 by veterinarians, and 3 by pharmacists.

There were 32 Pasteur stations in operation in Russia in 1914, in which 35,462 preventive treatments were given with 90 deaths. Excluding 3,490 cases not bitten, the mortality was 0.3 per cent.

As a result of the reconstruction called for by the revolution the central bureau of public health is likely to have on the one hand less theoretical power and on the other hand more actual influence for good than it ever had under the old régime. The functions of legal and administrative medicine which it exercised in the past will no doubt be delegated to local authorities; but the central bureau will be in position to guide and develop local health work throughout the Republic with wisdom and success.

The future central organization will probably bear to the provincial zemstvo health administration much the same relation that the latter now bears to the district sanitary organization. There will be a large council of some 200 members chosen by the provincial zemstvos and the municipalities, with representatives named by the national government. This council will hold plenary sessions two or three times a year and will itself elect a small permanent council of some 20 members. The work of the administrative bureau will be directed by this permanent council and sanitary legislation will, it is hoped, be enacted by the provisional government on its advice and suggestion. It will be the task of the council and the bureau to work out comprehensive plans for the development and standardization of medical and sanitary work throughout the Republic and to provide as promptly as possible medical and sanitary care for those Provinces which at present have no zemstvo organization.

The outline cited below is a proposed plan for the reorganization of the central bureau of public health, which has been prepared and printed and was being favorably considered by the authorities in August, 1917. It may be cited in full as an example of the general sort of health organization which met with approval during the days of reconstruction under the Kerensky government. It will be noted that it calls for a high degree of decentralization as is essential to meet the demands of the revolution, while at the same time providing a strong central staff of advisory experts.

Plan for the Organization of a Central Sanitary Medical Service.

I. All questions concerning the health and sanitation of the civilian population shall be under the jurisdiction of the central medical sanitary service in accordance with the following regulations and corresponding State laws.

II. The duties of the central medical sanitary service shall include:

1. The preparation of new laws concerning questions of a medical, sanitary, pharmaceutical and medico-legal nature.
2. The furnishing to local self-governing bodies in their work of protecting the public health of assistance in the shape of money, medical assistance, information and reports.
3. The sanitary protection of sea and land boundaries.
4. The collection and publication of statistical data in regard to the movement of population, morbidity and mortality, the analysis of statistical and scientific material in regard to general health conditions, and the working out of a program for improving sanitary conditions and the prevention of communicable diseases.
5. The supervision of local medical-sanitary work in provinces and territories where it is not in charge of local self-governing bodies.
6. The working out of regulations concerning international sanitary agreements.
7. The execution of orders of the central medical sanitary council in regard to medical supervision and all business concerning other ministries. In connection with these questions the central medical sanitary service is the administrative organ of the central medical sanitary council.

III. In matters of internal and general organization and also of all sanitary matters under the ministry of the interior, the central medical sanitary service is subordinate to the minister of the interior.

IV. The staff of the service shall consist of (1) head of the service; (2) heads of divisions; (3) director of publications; (4) legal advisor; (5) secretary; (6) senior and junior assistants to the heads, traveling physicians and clerks.

V. The chief of the central medical sanitary service has control and supervision of all his personal staff. He takes the place of the minister of the interior in the higher Government institutions so far as all business concerning the central medical sanitary service is concerned; he is in charge of all current business of the central medical sanitary service; and he has all rights appropriate to the rank of assistant minister.

VI. Division heads are responsible assistants to the chief of the central medical sanitary service, each in his particular field, and take his place therein in case of need.

VII. The central medical sanitary service contains the following divisions: (1) Governmental and public health, (2) medical and hospital help, (3) epidemiology, (4) supervision of health resorts, (5) supervision of pharmacies, (6) supervision of medical schools, (7) legal and official medicine, (8) statistics, (9) office staff, (10) publications, (11) legal advice, (12) secretary to the chief.

VIII. The duties of local sanitary medical control, of pharmaceutical matters and legal medicine, which according to present laws are vested in the provincial government bureaus, are to be exercised by the provincial zemstvos and in capitals and large cities by the municipal organizations. To meet these obligations, provincial zemstvos and dumas must provide new departments or reorganize existing medical offices so as to provide in every province experts competent to direct state medicine, legal medicine and pharmacy. To fulfill the duties of legal medicine it will be necessary for the zemstvos and dumas to create a new organization of medico-legal experts. Such departments will be subordinate to their respective zemstvos and dumas but will be required to transmit to the central medical sanitary service all reports which are required by law and such other information in regard to sanitary and medical matters as the central medical sanitary service may require.

IX. In Provinces and territories in which there are difficulties in the way of the immediate transfer of all the medical business previously carried on by provincial and district medical bureaus, municipal and police physicians to the self-governing bodies there shall be provided, until final organization of the zemstvo medical bureaus can be accomplished, organized medical-sanitary offices and medico-legal experts at the expense of the central government and under the direction of the Central Medical Sanitary Service such provincial medical-sanitary offices to be acting organs of the provincial medical-sanitary councils.

X. The functions of the provincial medical-sanitary offices shall be as follows:

1. Registration of physicians and pharmacists, of pharmacies drug stores, factories, and laboratories engaged in the preparation of drugs, of medico-legal statistics, of statistical data in regard to the medical inspection of recruits and of school inspection, of dentists, medical assistants, midwives, practitioners of massage and physical culture, registration of hospitals.

2. Control of the practice of medicine.

3. Supervision of private hospitals and private diagnostic laboratories.

4. Censorship of medical publications concerning drugs and curative treatments.

5. License and control of private medical schools.

6. Licensing and control of pharmacies, shops, factories, and laboratories, and preparing drugs, sera, vaccines, and other therapeutic preparations.

7. Granting licenses for the sale of cosmetics.

8. Management of hospitals and schools maintained by Central Medical Sanitary Service.

9. Approval of certificates submitted by court authorities in regard to examinations of sick persons or dead bodies and reexamination of material proofs in cases of conflict of evidence and the results of an inquest, or in cases of doubt as to the exact interpretation of medical signs noted in the examination of a body.

10. Approval of results of medical examinations in cases of pension claims, sickness insurance benefits, divorce cases, or any personal or property rights.

Such matters may be brought before the medical-sanitary office: By official experts in cases of disagreement; by persons at whose request the original examination was made (if they doubt its regularity); by the subject of the examination if he holds the physician's finding to be unjust.

11. Control and supervision of medico-legal matters.

12. Provision of facilities for necessary laboratory examinations of material proofs. Laboratories must be organized as branches of the medical-sanitary offices; or one laboratory may be organized jointly by several medical-sanitary offices; or by approval of the Central Medical Sanitary Service, the provincial medical-sanitary officer can transfer this work to other public or private laboratories.

13. The certificates and actions mentioned in paragraphs 9 and 10 are passed upon by a board consisting of the provincial medical sanitarian as chairman, three of his assistants, representatives of the Public Health Society and any specialists appointed by the board.

XI. In Provinces, territories, and cities where medical-sanitary offices are maintained at the expense of the central government their staff shall be made up as follows: (1) Provincial medical sanitarian, (2) assistants in charge of medico-legal and pharmaceutical divisions; (3) chief clerk; (4) medical inspectors.

XII. For the carrying out of medico-legal and administrative investigations in cases prescribed by law there shall be constituted a special institute of medico-legal experts.

Vital Statistics of Russia.

Russia has not had a general census since the year 1897, and there is no general system of registration of births and deaths other than the church records, which are reasonably complete and are carefully kept and analyzed by the central statistical committee of the ministry of the interior. The Russian has a gift for statistics, and statistical bureaus are well organized and directed by very competent experts, so that such figures as are available are reasonably reliable.

The central statistical committee published last year a volume on "Statistics of the Russian Empire; Movement of Population of European Russia for the Year 1910," some of the data from which may be worth citation and analysis. The estimated population of European Russia for that year was 118,700,000. The calculated marriage rate was 8.2 per 1,000, the birth rate, 44, and the death rate, 30.8. The birth rate by religions varied from 47.1 among the Orthodox and Mahometans to 22.3 among the Protestants and 21.7 among the Hebrews. The death rate varied from 33.4 among the Orthodox and 27.5 among the Mahometans to 15.9 among the Protestants and 12.4 among the Hebrews. The Orthodox in European Russia make up 83 per cent of the total population, and each of the other four religions between 3 and 6 per cent.

Thirty-eight per cent of all deaths were under one year of age and 21 per cent between one and five years.

The mortality rate in European Russia has decreased quite steadily from 37.2 in 1867-1871 to the figure of 30.8 cited above for 1910.

Death rates by causes are wholly lacking except for the cities, but cases of communicable diseases are reported by hospitals and by zemstvo and factory physicians to the central council of public health. The table below shows the incidence of morbidity from certain principal causes in 1914 for 91 Provinces.

Morbidity rates for certain communicable diseases, 1914, in 91 provinces of Russia.

[Cases per 100,000 population.]

Scabies	3, 676	Whooping cough	262
Influenza	2, 377	Measles	260
Malaria	2, 190	Typhoid fever	236
Syphilis	747	Smallpox	63
Trachoma	592	Typhus fever	59
Pulmonary tuberculosis	516	Scurvy	19
Lobar pneumonia	328	Relapsing fever	11
Diphtheria	279		

The annual reports of the central council of public health also contain tabulated data of death rates from certain causes for the principal cities of Russia, which are based on data collected by the health bureaus of the cities on a system of registration similar to our own. In the table below it will be noted that the figures for Petrograd are somewhat lower than those cited above. They are evidently based on a slightly higher population estimate than that obtained by me from the municipal authorities.

Recorded death rates from certain causes per 100,000 population—Russian cities, 1914.

	Petrograd.	Moscow.	Odessa.	Warsaw.	Other cities, population 3,950,000.
Smallpox	16	4	2	23	21
Measles	79	77	13	21	65
Scarlet fever	39	37	36	59	62
Whooping cough	16	23	11	19	21
Influenza	16	17	2	2	16
Diphtheria	26	33	20	10	41
Typhoid fever	32	21	26	24	40
Typhus fever	1	3	2	1	4
Relapsing fever	....	1	1	....	2
Dysentery	25	53	8	24	56

The Problem of Infant Mortality.

There is one public-health problem which is everywhere of such importance as to deserve special consideration and which in Russia possesses a peculiarly dominant importance, the problem of the protection of the infant during its first year of life.

This question has received serious consideration from Russian sanitarians and statisticians ever since the Russian Economic Society at its meeting in Petrograd in 1835 called special attention to the great mortality of infants among the peasants. In the report on infant mortality in Russia, prepared by Drs. S. Gliebovsky and B. Griebenshikov for the 1906 International Congress of Charities at Milan (L'assistance publique et privée en Russie; Acad. Imp. des Sci. Petrograd, 1906), the high infant mortality rate of Russia was emphasized very forcibly and was attributed chiefly to the fact that the agricultural labor of women, particularly among the Great Russians, interferes with the breast feeding and maternal care which are essential if a fair proportion of the infants born into the world are to survive.

I have been unable to find any very recent infant mortality statistics for Russia as a whole, but a study of the "Statistics as to Movement of Population in 1910," published by the central statistical committee, indicates that in that year deaths under 1 year made up 38 per cent of the deaths at all ages. The infant mortality rate (deaths under 1 year per 1,000 births) was 266 for European Russia, while at the same period the rates for certain other countries were: Austria-Hungary, 207; Germany, 192; Italy, 142; England and Wales, 130; France, 111; Denmark, 106; Sweden, 75; Norway, 67; and New Zealand, 56.

The rates by Provinces in 1910 varied from 370 in Viatka to 134 in Esthonia, the higher rates obtaining generally in the north and east (Viatka, Olonetz, Kostroma, Simbirsk, Nijni-Novgorod, Kaluga, Smolensk, Novgorod, Vologda, Tver, Penza, Vladimir, Samara, all over 300), and the low rates almost universally in the west (Esthonia, Courland, Vilna, Livonia, Minsk, Volhynia, Podolia, Poltava, Grodno, and the Crimea, all under 200). This distribution for 1910 corresponds fairly well to that reported by Gliebovsky and Griebenshikov for 1895–1899, and it seems clear that the lower rates in the west are due to the better care given to the children of the Finns and Letts of the Baltic Provinces, and the Lithuanians, Poles, Jews, and Germans of the west as compared with the Great Russian peasants of the central and eastern Provinces. By religions the authors cited above give the following infant mortality rates: Hebrews, 128; Catholics, 150; Mahometans, 163; Protestants, 179; Orthodox, 285.

A valuable study of the "Mortality of Nursing Infants in Petrograd during the 10-year period 1906–1915," by V. E. Bienshtok, has recently been published as Monograph No. 1 of the statistical bureau of the city of Petrograd. It shows that the infant mortality rate of the city was as high as 330.8 in 1882; since 1886 it has varied by years between 218.8 and 277.7, and by five-year periods from 238.3 (1891–1895) to 256.3 (1906–1910). The 1915 figure was 251, so that there has been no appreciable decrease in these enormous rates for a quarter of a century. The rates by districts varied for 1906–1915 from 122 in the Liteinyi and 123 in the Admiralty to 279 in the Alexander-Nevsky (industrial) quarter.

Twenty-five per cent of the infant deaths occur during the first month and 18 per cent during the first week. The second and third months of life account for 16 per cent of the total, the fourth to the sixth month for 24 per cent, the seventh to the ninth month for 19 per cent, and the tenth to the twelfth month for 15 per cent. Seasonal differences are not as striking as might be expected, 25 per cent of infant deaths occurring during the winter, 28 per cent during the spring, 28 per cent during the summer, and 18 per cent during the autumn months.

Of all the infant deaths in Petrograd 32.1 per cent were due to digestive diseases, 21.7 per cent to congenital debility, 20.5 per cent to pneumonia, 5.4 per cent to acute contagia (measles, diphtheria, scarlet fever), 2.6 per cent to tuberculosis, and 17.6 per cent to other causes.

The enormous infant mortality rate of Russia is of course due as everywhere, to Dr. Emmet Holt's twin factors, "Poverty and Ignorance," in an accentuated form. Gliebovsky and Griebenshikov point out the close relation between the variation in infant welfare rates and illiteracy by races, 70 per cent of men and 91 per cent of women being illiterate among the true Russians as against 40 per cent of men and 41 per cent of women among the Germans, 48 per cent of men and 47 per cent of women among the Letts and Lithuanians, and 51 per cent of men and 72 per cent of women among the Hebrews. In particular it is ignorance in regard to the principles of infant feeding which contributes most conspicuously to the unfortunate results observed. The Russian mother is apt to continue to give breast milk to her infant for a considerable period; but unfortunately she gives the child other and less innocuous foods from a very early age. Thus of a group of mothers in Saratov Province only 10 per cent were found by Dr. Minkh to be bringing up their babies on breast milk only, while in another district only 1.4 per cent nursed their babies without the addition of other food up to the seventh or eighth month. Of 2,000 women canvassed by one investigator in the province of Orel, 49 per cent had begun artificial feeding by the end of the first month.

The remedy for all this is of course clear and obvious—the establishment of infant-welfare stations for the instruction of mothers in the duties of maternity and such an improvement in their economic condition as may enable them properly to fulfill those duties.

An admirable beginning has been made along these lines, as has been suggested in discussing the work of public health administration in Petrograd and Moscow. The first goutte de lait was established by Dr. W. Hubert at Petrograd in 1901, and the more important educational work of the Consultation des Nourrisons, or baby clinic, was begun about 10 years ago. A most important factor in the development of this work has been the All Russian Patronage for the Protection of Motherhood and Childhood, which maintains stations in various parts of the country and which has its main offices and publishes an admirable monthly journal at Petrograd. This patronage has a most excellent Infant Welfare Museum on Kameny Ostrov Island in Petrograd with a remarkable series of anatomical models, charts and pictures, and a good library; and a fund of 1,000,000 roubles contributed by the banks of Petrograd and Moscow on the occasion of the Romanov Tercentenary was set aside before the war to be devoted to the erection of buildings for the work of this society.

The splendidly equipped infant welfare station at the Morosov Hospital in Moscow has been mentioned above. I had the opportunity of observing the work done here and at the other welfare stations in Petrograd and Moscow, and so far as the work at the clinics is concerned it appeared to be of a wholly modern and satisfactory type. The principal thing lacking is the home instruction by nurses, which has proved so vital a factor in such work in America. The Patronage for the Protection of Motherhood and Childhood has made a beginning along this line, having about 15 nurses doing home visiting in Petrograd, but the municipalities have not as yet any facilities for such educational work. All the infant welfare work in Russia, and particularly that in Petrograd, is gravely hampered at the present time by the shortage of milk which has resulted from the war and from the Revolution.

General Status and Future Needs of Public Health in Russia.

Public-health work in most countries has passed from a stage in which the sanitation of the environment was its chief preoccupation, to one in which the control of community infections by epidemiological, bacteriological, and serological methods is predominant; and from this second phase it tends to proceed to a third, in which emphasis is laid on the hygienic education of the individual.

The first of these stages, that of sanitary engineering, has so far been somewhat neglected in the development of Russian public health. In 1912 out of 1,063 towns and urban settlements with a population of over 10,000 only 219, or 20.6 per cent, had an organized water supply of any kind, only 167 supplied this water to private houses, and only 59 had filters. As pointed out above there are to-day not more than a dozen cities that have modern sewerage systems and only half this number have systems of sewage treatment. The custom of boiling water and cooking milk before use materially assists in preventing the epidemics that we should expect might follow. At every railroad station, for example, there is a Kipyatok or tank of boiling water with a tap from which water may be drawn for tea, and the crowd of soldiers and other passengers running out with their teapots to these taps is the most characteristic feature of Russian railway life. As is the case all through the East, in China and Japan, one is struck with the extent to which cookery may take the place of sanitary engineering. From the standpoint of nuisance, too, it is somewhat remarkable that the night-soil removal system of Petrograd, for example, can be conducted with so little offense to the senses. It was only after several weeks of residence that I learned that the sewers of the city did not dispose of its fecal wastes.

Modern sanitary engineering will of course have its day in Russia, and when the time comes its development will be a fruitful one. Russian engineering is solid and successful. The smaller water purification plant at Petrograd, though costly both in construction and in operation, has interesting features in its design, while M. Stroganoff's experiments at Moscow are probably the most extensive and important sewage-treatment studies which are being conducted anywhere in the world to-day.

The principal developments of Russian public health have been along medical and bacteriological lines, in the control of the more acute communicable diseases and in the field of vital statistics. The statistical bureaus of the central council of public health and of the larger cities are better equipped with funds and with highly trained specialists than our own. The bacteriological and chemical laboratories are also highly developed and in charge of high-grade men with leisure and inclination for productive research as well as routine duties.

The control of communicable diseases is in general reasonably effective in the large cities; and the leaders in this field are in sympathy with the modern American view as to the supreme importance of bedside care of the individual and the detection of carriers as compared with the terminal disinfection of places and fomites. In current practice, however, terminal disinfection still occupies a very large place in municipal sanitation, a condition to some extent justified by the danger of insect-borne diseases, such as typhus and relapsing fever. The success with which these latter diseases are controlled in the larger cities is a credit to Russian sanitary science. In certain parts of the country, however, these diseases, and particularly malaria, constitute grave public-health problems which must be dealt with in the future.

Smallpox vaccine should obviously be used far more extensively than at present. Scarlet fever is much more serious than with us in spite of the rather common treatment with streptococcic vaccines.

Considerable attention is devoted to food inspection, mainly along chemical lines. The supervision of milk supplies is, however, in its infancy. There is little farm inspection and practically no bacteriological control.

Medical inspection of schools is general and well developed, the school doctors in many districts undertaking the care of the sick children in their homes as well as diagnosis in the school. School nurses are not, however, utilized as with us and public health nursing in general is a problem for the future.

There are schools for training public health workers in Petrograd and in Moscow, the former at the clinical institute under Dr. Gregor Khlopin being the most fully developed. The course at this institute is a post-graduate course of three months' duration with about eight hours of lecture and laboratory work a day, or 656 hours in all.

The program of the work as given in the last printed announcement of the school is sufficiently interesting to be cited in full.

Lecture courses:	Hours.
Climatology	6
Housing and clothing	12
Water supply and waste disposal	20
Nutrition	8
Food adulteration	6
Sanitary methods and results	30
School hygiene	16
Lecture courses—Continued.	Hours.
Physical instruction and gymnastics	6
Industrial hygiene	16
General epidemiology	16
Epidemiology of typhoid	2
Epidemiology of malaria, plague, syphilis, and tuberculosis	8

Lecture courses—Continued.	Hours.
Bacteriology and immunology	20
Chemism and relation of microbes to circulation of certain elements	2
Disinfection	8
Public health organization and sanitary legislation in Russia and abroad	16
Organization of zemstvo medicine	8
Organization of municipal medicine	8
Organization of sanitary statistics	16
Technique of sanitary organization	20
Clinical features of cholera, typhoid, and relapsing fever	6
Pathology of diphtheria, cholera, plague, and typhus fever	6
Laboratory and practice courses:	
Chemistry	170
Bacteriology	160
Pathological anatomy	10
School hygiene	40
Problems for the sanitary expert	20

Perhaps a hundred students a year on the average took this course before the war, 15 to 20 per cent of them being women.

The most important future developments of public health, in Russia, as elsewhere, must be along educational lines in connection with the three major problems of venereal disease, tuberculosis, and infant mortality, for it is here that the great harvests of disease prevention are to be reaped and here that least has so far been accomplished.

In Petrograd Dr. Haffkine has opened six venereal clinics for medical and prophylactic treatment, but in many parts of the country, particularly in Siberia and in the Caucasus, the lack of medical care makes this problem a very difficult one. The war, as everywhere, has increased venereal disease to a very serious degree.

The antituberculosis campaign is still in its infancy in Russia. The Red Cross did some antituberculosis work before the war and there are a few sanatoria, but very few in proportion to the need. Petrograd has only one poorly organized tuberculosis clinic. It is probable that the Russian has a high natural resistance to tuberculosis; and this fact combined with the rigorous examination of recruits for the army has prevented any such shocking increase as has taken place in France in spite of the peculiarly insanitary conditions under which so many Russian troops are housed in peasant dwellings behind the front. There is little doubt, however, that tuberculosis is more prevalent, in both the civil and military population, than is commonly recognized or than is indicated on the face of the statistics. "Chronic pneumonia" is a commonly reported cause of death even in the army. A vigorous and comprehensive antituberculosis campaign will be certainly one of Russia's first problems after the war.

The largest single task of public health in Russia is, however, the control of infant mortality. There are approximately 1,500,000 infant deaths in Russia every year, of which two-thirds should be preventable according to such standards as have been set in New

York City. Even allowing for the economic difficulties which must interfere with prenatal precautions and infant care among the Russian peasants, it seems certain that a comprehensive campaign for the prevention of infant mortality could save half a million lives a year in Russia. The admirable infant welfare stations of Petrograd and Moscow and those maintained elsewhere by the Patronage for the Protection of Motherhood and Childhood need only to be multiplied throughout the Republic and supplemented by the organization of a staff of visiting nurses for domiciliary education in order to solve the problem satisfactorily.

From the standpoint of administrative procedure there are two points about Russian health organization which are peculiarly favorable for future progress.

In the first place, one is impressed with the possibilities of the numerous advisory boards, made up largely of active employees, with which both zemstvo and municipal executives are surrounded. Such organizations must often prove cumbrous and time consuming, but they tend to favor initiative and esprit de corps on the part of the staff. It is interesting to note that even before the revolution Russia was in this respect in position to give a lesson in democracy to the rest of the world.

The great strategic point in the Russian health situation is, however, the remarkable development of social medicine along curative lines and the consequent close connection between curative and preventive work. Russia, on account of the peculiarly acute needs of her rural population, has already developed the State care of the sick to a point of which we are only beginning to dream, and after the war the new republican government will no doubt pursue this social ideal to a much higher point of perfection. The opportunity for developing preventive educational work in connection with such a system is practically unlimited. In connection with infant mortality, for example, the high proportion of deliveries in maternity hospitals (in Petrograd nearly half of all births) is a most favorable circumstance. We may therefore look in the future, as zemstvo and municipal medicine develop and acquire the educational and preventive quality which is in accord with modern progress, for unprecedented successes in the control of preventable disease in the great sister Republic.

MALARIA IN FLORIDA.

PREVALENCE AND GEOGRAPHIC DISTRIBUTION—APRIL, 1915, TO DECEMBER, 1916.

The study of the prevalence and geographic distribution of malarial fevers in the State of Florida through the circularization of the practicing physicians was begun in 1913. Previous reports on this sub-